AMENDMENTS TO THE CLAIMS

Please amend claims 1-31 as follows. The following listing of claims replaces all prior versions and listings of claims in this application:

1. (currently amended) A method to determine ~~for determining a~~ deployment level of an airbag in a vehicle, the method comprising the following steps:

(a) repeatedly capturing a plurality of frames of time-of-flight (TOF) three-dimensional depth images of a scene that includes a region of a seat in said vehicle ~~seat~~, from which plurality of frames data representing occupancy of said seat may be determined with a confidence level greater than if data from a single frame were used; and

(b) repeatedly determining occupancy information using confidence enhancing plurality of frames captured at step (a), wherein determined said occupancy information is useable to determine deployment level to intelligently control deployment of said airbag; ~~from at least one of said three-dimensional captured depth images;~~

~~(c) upon occurrence of an airbag-deployment triggering event repeating step (a) and step (b) more frequently than before occurrence of said airbag-deployment triggering event; and~~

~~(d) indicating airbag deployment level based at least in part on occupancy information determined after occurrence of said airbag deployment triggering event;~~

2. The method of claim 1, further including:

(c) upon receipt of an airbag-deployment triggering event, repeating at least portions of step (a) and step (b) more frequently than before occurrence of said airbag-deployment triggering event. ~~wherein step (b) includes determining position information of an occupant on the said vehicle seat.~~

3. (currently amended) The method of claim 1, further including:

(d) determining airbag deployment level based at least in part on occupancy

data captured after occurrence of an airbag-deployment triggering event;

wherein such airbag deployment level determination is useable to intelligently control deployment of said airbag.

~~wherein step (b) includes determining where a designated component of said occupant is relative to an area from which said airbag is to be deployed.~~

4. (currently amended) The method of claim ~~3~~ 1, further including:

(c) upon receipt of an airbag-deployment triggering event, repeating at least portions of step (a) and step (b) more frequently than before identification of occurrence of said airbag-deployment triggering event; and

(d) determining airbag deployment level based at least in part on occupancy data captured after occurrence of an airbag-deployment triggering event;

wherein such airbag deployment level determination is useable to intelligently control deployment of said airbag.

~~wherein determining where a designated component of the occupant is includes determining where at least one of a head and torso of said occupant is relative to said area from which said airbag is to be deployed.~~

5. (currently amended) The method of claim 1, wherein step (b) includes at least one procedure selected from a group consisting of (i) using a hierarchical layered determination method, and (ii) using a training algorithm. ~~further including classifying said object from at least one of said captured depth Images.~~

6. (currently amended) The method of claim ~~5~~ 1, wherein step (b) includes at least one determination selected from a group consisting of (i) determining position information of an occupant of said seat, (ii) determining position information of an occupant of said seat relative to a region from which said airbag is deployable, (iii) determining position information of at least one body portion of an occupant of said seat, (iv) determining position information of at least one body portion of an occupant of said seat relative to a region from which said airbag is deployable, (v) determining a

pose of an occupant of said seat; and (vi) determining whether an extremity of said occupant of said seat extends towards a region from which said airbag is deployable. ~~wherein classifying said object from at least one of said captured depth images is performed triggered deployment of said airbag~~.

7. (currently amended) The method of claim ~~6~~ 1, further including at least one occupant classification selected from a group consisting of (i) classifying an occupant of said seat, (ii) classifying an occupant of said seat before occurrence of an airbag-deployment triggering event, (iii) classifying an occupant of said seat immediately upon start-up of said vehicle ~~classifying said object from at least one of said captured depth images is performed immediately after start-up of said vehicle~~.

8. (currently amended) The method of claim 1, wherein step (b) includes a training algorithm selected from a group consisting of (i) a nearest neighbor classifier, (ii) a support vector machine, (iii) a neural network, and (iv) a linear discriminant analyzer. ~~a single occurrence of step (a) and step (b) and step (c) requires less than about 100 ms.~~

9. (currently amended) The method of claim 1, wherein ~~at least one of~~ step (a) ~~,~~ ~~step (b) and step (c)~~ includes capturing at least one depth image with lower resolution than ~~was~~ resolution used before occurrence of ~~said~~ an airbag-deployment triggering event.

10. (currently amended) The method of claim 1, further including ~~wherein step (d) includes~~ determining deployment level in a manner selected from a group consisting of (i) lowering deployment level when said occupant is less than a minimum ~~maximum~~ distance from a region from which said airbag is deployable ~~an area from which said airbag is to be deployed~~, and (ii) maximizing deployment level when said occupant is a maximum distance from a region from which said airbag is deployable.

11. (currently amended) The method of claim ~~1~~ 2, wherein step (c) includes

processing input from at least one sensor that signals occurrence of a collision involving said vehicle. ~~step (d) includes maximizing deployment level when said occupant is a maximum distance from an area from which said airbag is to be deployed~~.

12. (currently amended) The method of claim 1, wherein intelligent deployment of said airbag includes deployment selected from a group consisting of (i) mandatory deployment, (ii) deployment at reduced power, (iii) non-deployment, and (iv) unconditional non-deployment. ~~wherein step (b) includes determining a pose of said occupant.~~

13. (currently amended) The method of claim ~~12~~ 1, wherein step (a) includes acquiring from at least a region of said scene at least one of (i) depth map information, (ii) reflectivity-based intensity information, and (iii) intensity-based information. ~~determining a pose of said occupant includes determining whether an extremity of said occupant is extended towards an area from which said airbag is to be deployed.~~

14. (currently amended) The method of claim 1, ~~wherein step (d) includes~~ further including disabling airbag deployment when at least a portion of said occupant is determined to be too close to a region from which said airbag is deployable. ~~an area from which said airbag is to be deployed.~~

15. (currently amended) A three-dimension time-of-flight (TOF) sensor system to determine deployment level of an airbag in a vehicle, the sensor system comprising:

a light source to emit light onto a scene that includes a region of a vehicle seat protectable by said airbag;

a sensor array disposed to capture light reflected from said scene including reflected light from said light source;

means for repeatedly capturing a plurality of frames of time-of-flight (TOF) three-dimensional depth images of said scene, from which plurality of frames data representing occupancy of said seat may be determined with a confidence level greater than if data from a single frame were used; and

means for repeatedly determining occupancy information using confidence

enhancing plurality of frames captured by said sensor array, wherein determined said occupancy information is useable to determine deployment level to intelligently control deployment of said airbag.

~~A three-dimensional sensor system to determine a deployment level of an airbag in a vehicle, the sensor system comprising::~~

~~a light source to emit light onto a scene that includes a vehicle seat to be protected by said airbag when said vehicle seat is occupied;~~

~~an array of light-sensitive pixels disposed to capture reflected light from said scene, including including light emitted by said light source, such that in at least one scene capture, three-dimensional data representing said scene are captured;~~

- ~~processing resources to determine depth information for an object in said scene based upon at least one time-of-flight (TOF) characteristic of reflected light emitted by said light source and captured by said array, said processing resources configured to determine occupancy data for said object based upon reflected light from said scene captured by said array, and to determine airbag deployment level based at least in part upon occupancy data, responsive to receiving data indicating occurrence of a collision of said vehicle.~~

16. (currently amended) The sensor system of claim 15, wherein upon receipt of an airbag-deployment triggering event, said means for repeatedly capturing captures more frequently and said means for repeatedly determining determines more frequently than before occurrence of said airbag-deployment triggering event. ~~said processing resources communicate airbag deployment level, responsive to data indicating occurrence of a collision of said vehicle, to an airbag actuating device.~~

17. (currently amended) The sensor system of claim 15, wherein upon occurrence of an airbag-deployment triggering event, airbag deployment level is determined based at least in part on occupancy data captured after occurrence of an airbag-deployment triggering event;

wherein airbag deployment level determination is useable to intelligently control

deployment of said airbag. ~~wherein said light source emits a modulated infrared light.~~

18. (currently amended) The sensor system of claim ~~17~~ 15, wherein upon occurrence of an airbag-deployment triggering event,

said means for repeatedly capturing captures more frequently and said means for repeatedly determining determines more frequently than before occurrence of said airbag-deployment triggering event; and

airbag deployment level is determined based at least in part on occupancy data captured after occurrence of an airbag-deployment triggering event;;

wherein airbag deployment level determination is useable to intelligently control deployment of said airbag. ~~wherein said time-of-flight characteristic includes a phase shift between modulated light emitted from said light source and reflected modulated light captured by said array of light-sensitive pixels.~~

19. (currently amended) The sensor system of claim 15, wherein said means for determining includes at least one procedure selected from a group consisting of (i) a hierarchical layered determination, and (ii) a training algorithm. ~~array of light-sensitive pixels is formed on complementary metal oxide semiconductor device.~~

20. (currently amended) The sensor system of claim 15, wherein said means for repeatedly determining carries out at least one determination selected from a group consisting of (i) determining position information of an occupant of said seat, (ii) determining position information of an occupant of said seat relative to a region from which said airbag is deployable, (iii) determining position information of at least one body portion of an occupant of said seat, (iv) determining position information of at least one body portion of an occupant of said seat relative to a region from which said airbag is deployable, (v) determining a pose of an occupant of said seat; and (vi) determining whether an extremity of said occupant of said seat extends towards a region from which said airbag is deployable. ~~processing resources are configured to determine occupancy classification based on capture by said array of light-sensitive pixels of reflected light emitted by said light source.~~

21. (currently amended) The sensor system of claim ~~20~~ 15, wherein occupant classification includes at least one classification selected from a group consisting of (i) classifying an occupant of said seat, (ii) classifying an occupant of said seat before occurrence of an airbag-deployment triggering event, (iii) classifying an occupant of said seat immediately upon start-up of said vehicle. ~~wherein occupancy classification includes at least a first class including an adult, a second class including at least one of a child and a child seat, and a third class representing absence of any occupant.~~

22. (currently amended) The sensor system of claim ~~20~~ 15, said means for determining includes at least one training algorithm selected from a group consisting of (i) a nearest neighbor classifier, (ii) a support vector machine, (iii) a neural network, and (iv) a linear discriminant analyzer. ~~wherein said sensor system determines occupancy classification based on reflected light from said light source captured on said array of light-sensitive pixels.~~

23. (currently amended) The sensor system of claim 15, wherein said means for repeatedly capturing captures at least one depth image with lower resolution than resolution used before occurrence of an airbag-deployment triggering event. ~~said processing resources are configured to determine occupant position relative to a site from which said airbag is deployed using reflected light from said light source captured on said array of light-sensitive pixels.~~

24. (currently amended) The sensor system of claim ~~21~~ 15,wherein airbag deployment level is determined in a manner selected from a group consisting of (i) lowering deployment level when said occupant is less than a minimum distance from a region from which said airbag is deployable, and (ii) maximizing deployment level when said occupant is a maximum distance from a region from which said airbag is deployable.~~wherein said processing resources are configured to signal data indicating at least one of a partial deployment level and zero deployment level based on occupancy classification responsive to data indicating collision of said vehicle has occurred.~~

25. (currently amended) The sensor system of claim ~~23~~ 15, further including at least one sensor that signals occurrence of a collision involving said vehicle, output from said at least one sensor being processed to identify occurrence of an airbag-deployment triggering event. ~~wherein said processing resources are configured to signal data indicating at least one of a partial deployment level and a zero deployment level based on occupancy position responsive to data indicating collision of said vehicle has occurred.~~

26. (currently amended) The sensor system of claim ~~23~~ 15, wherein said means for determining intelligent deployment of said airbag includes deployment selected from a group consisting of (i) mandatory deployment, (ii) deployment at reduced power, (iii) non-deployment, and (iv) unconditional non-deployment. ~~said processing resources are configured to identify a tracking feature of said occupant so as to track said occupant relative to a site from which said airbag is deployed.~~

27. (currently amended) The sensor system of claim ~~23~~ 15, wherein said means for repeatedly capturing acquires from at least a region of said scene at least one of (i) depth map information, (ii) reflectivity-based intensity information, and (iii) intensity-based information. ~~said processing resources are configured to identify a tracking feature of said occupant based on scene-reflected light captured on said array of light-sensitive pixels.~~

28. (currently amended) The sensor system of claim 15, further including disabling airbag deployment when at least a portion of said occupant is determined to be too close to a region from which said airbag is deployable. ~~further comprising an optical filter to filter ambient light from reflected light in a scene captured on said array of light-sensitive pixels.~~

29. (currently amended) The sensor system of claim ~~28~~ 15, wherein said means for determining includes a training algorithm selected from a group consisting of (i) a nearest neighbor classifier, (ii) a support vector machine, (iii) a neural network, and (iv)

a linear discriminant analyzer. ~~optical filter is configured for low incidence angles to maintain a relatively narrow interference band.~~

30. (currently amended) The sensor system of claim ~~20~~ 15, wherein said system determines whether an image contains a face of a passenger in said seat. ~~further comprising an electrical noise reduction filter to enhance sensitivity of individual pixels in said array of pixels.~~

31. (currently amended) The sensor system of claim ~~30~~ 15, wherein at least a portion of said system operates under control of a processor. ~~further comprising a common-common mode reset circuit coupled to said array of pixels to at least reduce pixel saturation.~~